
Coastlines
ebb & flow

Focus on Coastal Towns

That's Quin-zee to You…

By Arden Miller, CZM

What do the Howard Johnson's hotel chain, the Bunker Hill monument, John Quincy Adams, John Adams, John Hancock, and Dunkin' Donuts have in common? Besides being widely recognized names prior to the inception of reality TV, all originated in the area today known as Quincy, Massachusetts. (And make sure you pronounce it Quin-*zee*; the other 19 Quincy's in the United States might say "Quin-see," but according to late historian William C. Edwards, the family of Colonel John Quincy—the city's namesake—pronounced the second syllable as a "zee.") But before anyone had ever debated the pronunciation of this place, heard of HoJos, or uttered the words, "I need your John Hancock," the 16.8 square-mile area, a mere 9 miles from "Port of Beston"—as Boston's harbor went by at that time—went through many name changes, all reflecting events and people who hold a place in the annals of history.

This fertile ground, with both harbor and ocean access, was an early candidate for the "Best Places to Live in the New World" title. Originally enjoyed primarily by the Algonquin Indians, in 1625 an English sea captain with the surname Wollaston successfully steered his way across the Atlantic with a boatload of indentured servants as cargo. The group settled in, and began referring to the area as Mount Wollaston. But not for long. Wollaston's employer assigned him elsewhere, so off he went, leaving the Mount open to another captain and son of England, Thomas Morton. Mere months after Wollaston's departure, Morton arrived and christened the area "Ma-re Mount"—a phonetic hybrid of "merry" and the Latin word for "sea." Morton referred to himself as "mine Hoste of Ma-re Mount" and was known for his fondness of merriment in the form of drinking alcohol and hosting indigenous women, behaviors looked down upon by the Puritans of Plymouth. In 1627, soon after hosting a spring celebration with an 80-foot maypole, abundant amounts of alcohol, and a poem proclaiming "the first of May/At Ma-re Mount shall be kept hollyday," Captain Myles Standish had him deported. Not one to follow orders, he returned several times over the years, much to the chagrin of local religious leaders. After his death in 1647, an independent church was established in his former colony as, it is believed, a safeguard against any lingering thoughts of licentious living.

The development of the church led to the establishment of the town of Braintree, of which Quincy was a precinct. Over the years, denizens of Braintree's northern precinct were eager for their own identity and, in 1792, in honor of one of the area's citizens who had never, to anyone's knowledge, cavorted around a maypole, the Massachusetts General Court incorporated the Town of Quincy in honor of Colonel John Quincy. One final name modification took place nearly 100 years later; in 1988, due to increased population and development, "town" gave way to "city."

During the aforementioned epithet evolution, numerous developments helped to shape Quincy's identity. Despite its proximity to the Atlantic, during the area's early settlement, most made a living from the land's natural resources, chiefly by farming and granite quarrying. In the mid-1800s, prior to the advent of cement, granite was a necessary element in the production of solid structures. The granite from the Quincy quarries was particularly prized as it was both durable and beautiful. *So* beautiful and durable in fact that the first commercial rail-line in the United States was developed in 1845 for the sole purpose of transporting the cumbersome quarry rocks to other parts of the country! With the inception of this rail line, accessibility to the area increased. And with immigrants migrating from around the world and other parts of the States, the area's second largest industry—shipbuilding—prospered. Many yards were in operation, building,

selling, and launching vessels of all sizes. One such yard, Fore River, became the second largest shipyard in all of the United States during WWI, and the yard garnered a place in history with its exclusive production of steel vessels. (For more on Fore River, see the "Kilroy Was Everywhere" sidebar.) While the yard has since closed down, one such "heavy cruiser"—the only one of its kind in existence today in fact—the *U.S.S. Salem*, has come home to rest in the harbor and houses the exhibit halls for the United States Navel Shipbuilding Museum. (For museum hours and admission prices, log on to www.uss-salem.org or call (617) 479-7900.)

While shipyards and quarries provided a way to make a living, those employed within these industries settled in particular areas which, over time, became distinguished by population, history, or geography. For example, those who live in the peninsula area of Quincy known as Houghs Neck are known locally as "neckers;" the area once known as "Shed's Neck" drew so many Germans to its shore throughout the 1600s that it became known as "Germantown," a moniker it retains to this day; and Squantum, the original power seat for the indigenous Algonquin Indians, retained its Native American name. (For more on specific neighborhoods, see www.scstest.com/quincy/neighborhoods.asp.)

And what would these neighborhoods be without Dunkin' Donuts? Originally called the "Open Kettle," the successful Quincy doughnut shop owned by William Rosenberg underwent international franchising and a name change in 1950 and the ubiquitous pink & orange coffee and doughnut shops took off. Twenty-five years earlier, another international success story brought Quincy into the news when Howard Johnson bought a drugstore and soda fountain in the Wollaston section of Quincy, which laid the foundation for more than 1,000 restaurants and hundreds of hotels under the Howard Johnson's umbrella.

Today, Quincy is home to Marina Bay—the largest marina in the Northeast. More than 88,000 people make their residence in one of Quincy's neighborhoods, giving this city the distinction of being the most heavily populated area on the Bay State's South Shore. Marina Bay, accessible beaches, and places of historically significance such as the Hancock Cemetery (the colonial colonies' *oldest* burial ground), make it a popular destination for tourists and in-state visitors alike. From maypole mythology to historical shipyards to chocolate munchkins from Dunkin' Donuts—Quin-zee has something for everyone!

For more information on Quincy, go to: www.scstest.com/quincy/attractions.asp.

photo by Don Wiener

Marina Bay—the largest marina in the Northeast is part of Quincy's appeal for both visitors and natives.

Kilroy Was Everywhere

By Arden Miller, CZM

The year was 1941. America and her allies were into the third year of the second World War. Those with televisions had witnessed the first commercial ever—an ad for Bulova watches. Mount Rushmore was recently completed and Curious George and Cheerios had just arrived on the scene. Movie-goers were talking about the Maltese Falcon (some are *still* talking, as it's considered by those who consider such things to be the very first in the *noir* film genre). On the radio, many households tuned in to "The Life of Riley." Fans of literature made *For Whom the Bell Tolls* by Ernest Hemingway one of the year's most acclaimed books. And throughout the country and, increasingly, the entire world, talk and legend was building for three little words: Kilroy was here.

Who was Kilroy? The much-scrawled name that took on a life of its own belonged to a supervisor at the Bethlehem Steel Corporation (later, this became the Fore River Shipyard), James J. Kilroy. What began as a practical practice—his way of signing off on the ships he'd inspected, making sure people were getting paid for work they'd completed—became a rallying cry for the allied forces. Since war-time production was in over-drive and there was no time to paint over his sign-off, ships left the yard with this phrase intact. Vessels, naturally, showed up in many places around the world and Kilroy came to represent an everyman's uber-GI. Often accompanying the phrase is a bulbous-nosed cartoon face peeking over a wall, a depiction introduced by British infantry, based on an English character named Mr. Chad. Many added this flourish in their own replications of the declaration and throughout the war, from Berlin to Belgrade, Lithuania to Latvia, outhouse walls and pool halls, Kilroy was here, there, and everywhere.

After the war, the legend, and the phrase, continued to gain popularity. Kilroy came to represent achievement and the indomitable spirit of the Allied Forces (with a dose of humor/humour for good measure). In honor of the ubiquitous Kilroy, marks have been left on the Great Wall of China; the Statue of Liberty's torch; the top of Mount Everest; the private bathroom used by Truman, Stalin, and Churchill during the Potsdam, Germany conference of 1945; and the moon!

Joint Ventures and Adventures in Coastal Wetlands Restoration

By Bruce Carlisle, Hunt Durey, Georgeann Keer, and Tim Smith, CZM

The Massachusetts Wetlands Restoration Program (WRP) was founded in 1994 to support voluntary, proactive restoration of degraded or former wetlands. To fulfill its mission, WRP works with a broad network of partners to develop regional restoration plans, identify and evaluate specific restoration opportunities, assess project feasibility, prepare engineering design plans, obtain permits, complete construction, monitor restoration progress, and deliver outreach and educational resources. From 1994 - 2004, 40 projects have been completed, totaling more than 500 acres of wetlands under restoration. During this period, the program has leveraged over $12.5 million in non-state funds, including $9.5 million in federal funds and nearly $1.5 million in private sector financial and technical service donations.

Wetlands Restoration Program Moves to CZM

To enhance coordination and to realize budget savings, WRP was transferred to the Massachusetts Office of Coastal Zone Management (CZM) from its former host, the Department of Environmental Protection (DEP), in July 2003. The realignment allows WRP to better synchronize efforts with CZM's regional, wetland assessment, and coastal water quality protection programs, as well as with the state's two National Estuary Programs—the Massachusetts Bays Program and the Buzzards Bay Project. The Executive Office of Environmental Affairs (EOEA) continues its strong support of WRP with capital funds to maintain two wetlands scientists/project managers, a restoration planner, a restoration specialist, technical services contracts, and coordination services with public/private partnerships. Integrated within CZM, the program will focus its efforts on wetland restoration in coastal watersheds, with an emphasis on the holistic restoration of coastal tidal or formerly tidal wetlands.

The Restoration Network

The not-so secret to the success of the Bay State's wetland restoration efforts lies in the strength, commitment, and networking of the program's various partners. This web of participants is comprised of WRP, project sponsors (frequently local municipalities or regional non-profits), Federal Coastal America partners, the Corporate Wetlands Restoration Partnership (CWRP), and other state agencies, non-profits, and academics. By combining resources, sharing information, pooling management skills, and assembling a range of technical expertise, the strengths of all the partners are merged to meet the complex challenges and needs of local restoration projects.

The Coastal America partnership plays a critical role in the Massachusetts restoration network. The partnership was formalized in 1992 with a Memorandum of Understanding signed by nine agency representatives of the Federal government, committing these organizations to coordinate and integrate their efforts with state, local, and non-government groups. In Massachusetts, the most active Federal agencies are the Army Corps of Engineers, the National Oceanic and Atmospheric Administration's Restoration Center and National Marine Fisheries Service (NMFS), the Department of Agriculture's Natural Resources Conservation Service (NRCS), the Fish and Wildlife Service (USFWS), the Environmental Protection Agency, and the Department of Transportation. In addition to providing valuable restoration experience and technical services, the Coastal America partners generate tremendous financial support to local projects. To date, these Federal partners have contributed the majority of restoration funding in Massachusetts and have made numerous projects possible in cases where local and state resources only covered a portion of the costs.

The restoration network also reaches outside of government to involve major corporations, non-governmental organizations, and private citizens. Private corporations participate through the CWRP, which allows companies to demonstrate a strong environmental ethic by donating funds and services to ecological restoration. Created in 1999, the Massachusetts CWRP was the first of its kind in the country and served as the model for the national and many state corporate partnerships. Since its inception, 46 companies have donated more than $1.5 million in cash and in-kind services. CWRP assistance in Massachusetts has supplied a major share of the non-federal match frequently required for project grants. Before CWRP, a significant portion of federal funding available for wetlands restoration went unused because project sponsors were unable to fulfill local cost share requirements.

Lending a Hand

Another important piece of the network is the growing role played by volunteers. Using a model developed on the North Shore, the Association to Preserve Cape Cod (APCC) has launched a new volunteer monitoring project for restoration sites on Cape Cod. Over the past five years, CZM, the

Massachusetts Bays Program, and Salem Sound Coastwatch have had great success with a program that trains volunteers in field monitoring techniques, acquires important data on salt marsh condition, and facilitates environmental stewardship and restoration ethics. With support from the Gulf of Maine Council on the Marine Environment and the KeySpan Foundation, APCC and CZM staff are training Cape Cod volunteers in these methods, rationale, and field sampling approaches so that they can help to track the condition of local salt marshes before and after restoration.

Adventures in Restoration

Standing atop the Bridge Creek culvert under Route 6A in Barnstable and looking north at the Cape Cod Railroad embankment, WRP project manager Georgeann Keer reflects on the history and future of the Bridge Creek salt marsh system. "For more than 100 years, undersized culverts beneath this road and that railroad have severely restricted the tidal flow to the marshes upstream, degrading the natural habitat functions and values of this system. First the area of marsh surface available to fish and water birds has been greatly reduced; secondly salinity in the marsh root zone has decreased, creating conditions favorable for the invasive common reed (*Phragmites australis*). So, with the completion of the two phases of restoration here, this site will gradually return to its former healthy and productive condition."

The Bridge Creek estuary is part of the Sandy Neck/Barnstable Harbor Area of Critical Environmental Concern, which includes 8,850 acres covering Sandy Neck barrier beach, Scorton Harbor and Creek, Barnstable Harbor, and surrounding salt marshes. Working with the town of Barnstable as the project sponsor, WRP capitalized on a unique opportunity to restore tidal flow when the U.S. Army Corps of Engineers announced plans to suspend rail traffic for repairs on the Cape Cod Canal bridge. The project partners had only a 6-week window in March and April 2003 to complete Phase I of the project, which involved the removal of the restrictive 36-inch culvert and installation of a 10-foot x 10-foot culvert beneath the railroad.

For this first phase, more than $700,000 was raised from EOEA, NRCS, USFWS, NMFS (through their community-based partnerships with the Gulf of Maine Council, Ducks Unlimited, and the Conservation Law Foundation), CWRP (The Gillette Company, Duke Energy, Battelle, KeySpan Foundation, and Capaccio Environmental Engineering), and the town of Barnstable. CWRP partners Earth Tech, Weston & Sampson Engineers, and The Louis Berger Group provided valuable technical services.

Commenting on the project's success, EOEA Secretary Ellen Roy Herzfelder said, "Meeting the tight timeline would not have been possible without the support of more than 20 government, non-profit, and corporate contributors. Their dedication to the Bridge Creek salt marsh restoration demonstrates the incredible power of public-private partnerships to accomplish environmental goals."

Project partners are now focusing their attention on Phase II, which is expected to go to construction in the Spring of 2005, and will entail the replacement of the undersized culvert beneath Route 6A, as well as important land acquisition and conservation restrictions of marsh and surrounding upland with the Massachusetts Department of Conservation and

another angle

IT'S A BEAUTIFUL MID-SEPTEMBER AFTERNOON and Tara Nye, Association to Preserve Cape Cod biologist and volunteer coordinator, is collecting and organizing field data sheets generated from an outing into the salt marsh at the East Sandwich Game Farm. The group with Nye is a little muddy and sweaty, but all have grins and are eager to find a date for the next sampling day. "The response has been way above and beyond what we had hoped for! We have over 40 volunteers monitoring plants and salinity at five sites—and this is only the pilot year," says Nye, adding, "I was going to put the salinity sampling on hold during the cold, hard winter months, but these guys would have none of it!" Nye expects that next year the program will be able to add a site or two as well as expand their sampling to include fish and birds at some sites. The group received additional support from ERM Group Foundation to continue this work in 2004. Volunteer efforts such as these provide an important piece of the puzzle. By helping to collect data at sites before and after restoration, they are filling a need that cannot be met by state resources alone.

Volunteers from the Association to Preserve Cape Cod use a seine to sample fish in a tidal creek in Sandwich.

photo by Tim Smith

Recreation (DCR) and The Nature Conservancy (TNC). Keer and the staff of WRP continue to provide critical technical support to the project, assist with grantwriting and fundraising, support the permit application process, and play a central role in project management. Recently, CZM, DCR, and TNC received $1 million from USFWS for the construction of Phase II and for land acquisition in the form of conservation easements in the Sandy Neck area. The Bridge Creek restoration partners have also been selected to receive a 2004 Coastal America Partnership Award for outstanding efforts to restore and protect the coastal environment.

Meanwhile new opportunities for restoration partnerships are emerging all over coastal Massachusetts. Currently, there are dozens of active wetland projects and many more candidates have been identified through WRP mapping and planning projects. As the restoration network moves forward on these opportunities, stayed tuned to *Coastlines* for future articles.

For More Information

Check out the Wetlands Restoration Program website at http://www.mass.gov/czm/wrp/index.htm.

See http://www.mass.gov/czm/wrp/education/currentupdate.htm for the current WRP email update and to subscribe to future editions.

Wetlands restoration in action

Before

Aerial view of the Cowyards in Dartmouth and original 192-foot long, 19- by 30-inch eliptical concrete culvert.

During

Construction was done between February and March, 2004. The original culvert was replaced by a 3- by 4-foot concrete box culvert.

photos by Steve Block

After

Style and substance! The new culvert will enhance tidal flows to 16 acres of salt marsh habitat.

photo by Sarah French Storer

The Economic and Environmental Challenges of Marinas in Massachusetts *By Robin Lacey, CZM*

Marinas—for many these coastal businesses are the primary gateway to the Commonwealth's coastal waters. Providing a variety of important services and facilities to boaters, such as vessel dockage and storage, fueling, maintenance, and sewage pumpouts, marinas are also large contributors to the state and local economy, employing skilled workers and bringing valued tourism dollars to Massachusetts. In a study conducted in 2001, the Massachusetts Marine Trades Association estimated that recreational boaters generate nearly $1.7 billion for the state's economy, including total industry revenues and associated spending. With 1,500 miles of coastline and more than 5 million residents living within 10 miles of the coast, it's no wonder that boating and the industries that support it are such a mainstay in the coastal communities of the Commonwealth.

Officially, the term "marina" covers marine boating facilities that provide essential services to boaters, and includes boatyards, yacht clubs, and town docks. Located right at the water's edge, sometimes in the most scenic and pristine coastal areas of the state, marinas have a significant potential to impact water quality. In addition, upwards of 186,000 vessels are registered or documented in Massachusetts and the growing popularity of boating combined with increased developmental pressures along the coast have focused attention on the water quality implications of marina practices.

Marinas and Nonpoint Source Pollution

A variety of routine activities can generate contaminants that are washed into rivers, streams, and the ocean when it rains. Nonpoint source (NPS) pollution is the technical term for this indirect runoff contamination, and the combined impacts of these countless small sources add up to significant pollution problems. In fact, NPS pollution is now the number one pollution problem facing coastal waters.

Marinas, like most other businesses, can generate significant amounts of NPS pollution, especially when they are improperly sited, designed, or operated. A variety of activities, including hull repair, engine maintenance, and fueling, have the potential to significantly impact nearby coastal water quality. For example, paints, solvents, oil and gasoline, and other hazardous materials generated through boat operation and maintenance are toxic to humans and marine life. In addition, sewage released by boaters contains bacteria that can make people sick and contaminate shellfish resources. Because of the close proximity of marinas to shore, the chance that these contaminants will reach the water is increased.

Many of these pollution sources from marinas can be addressed through cost-effective practices and the education of resident boaters. As part of its Coastal Nonpoint Source Pollution Program, the Massachusetts Office of Coastal Zone Management (CZM) has focused on the development of a guidance document, technical assistance, and education to help marina operators and boaters control their NPS pollution. The guidance document, drafted collaboratively with the marina industry, provides marina operators with a simple list of best management practices (BMPs) and other suggestions to reduce the environmental impacts of marinas. Titled *Massachusetts Clean Marine Guide*, this detailed document is available electronically on the CZM website at http://www.mass.gov/czm/marinas. To order a hard copy, email czm@state.ma.us or call the CZM Information Line at (617) 626-1212, and be sure to give the name of the publication, along with your name and address.

Regulatory Environment

Because of their potential environmental impacts, these generally small businesses have become some of the state's most heavily regulated. Marinas face a variety of federal, state, and local regulatory requirements covering such issues as structures in navigable waters, dredging to maintain boat access,

and stormwater runoff. To comply with regulations regarding hazardous materials and waste, fueling operations, and oil spill planning, marina owners and operators must undergo significant planning and reporting exercises. Overall, the costs associated with regulatory compliance can be significant to marinas, which operate already within a highly competitive industry.

These costs, coupled with development pressure in coastal communities, can lead marinas to seriously consider other options, such as selling to developers of housing or retail establishments. Private development of this kind generates its own potential pollution problems, and exacerbates issues of increasingly limited water access and available boat slips and moorings.

Marina Bay in Quincy is the largest marina on the East Coast.

Bilge socks, like the one held here by Len Gonsalves, Executive Director of the Buzzards Bay Action Committee, help to minimize accidental oil and gas spills from boat engines.

One practice that can impose a regulatory burden and cost to marinas is pressure washing boat hulls. Because copper and other contaminants in boat paint can be washed into nearby water bodies, pressure washing is subject to federal regulations that require significant pretreatment of the wash-water prior to discharge. As part of a comprehensive effort to assist marinas in tackling this difficult issue, CZM awarded $12,500 each to Cape Ann Marina in Gloucester and Arey's Pond Boatyard in Orleans to install treatment systems that will remove pollutants from the washwater, as well as to host demonstrations so that other marina operators, state officials, and the public can see how these systems work. The CZM website has additional information about this program at http://www.mass.gov/czm/marinas/pressurewashing.

Clean Marina Program

To help balance water quality protection with the benefits of improving boater access to the coast, CZM, in partnership with the marina industry, is developing the Massachusetts Clean Marina Program. This volunteer, incentive-based effort will recognize marinas that are not only in environmental compliance, but strive to go a step further in lessening their impact on the coastal environment. This program is modeled after successful programs in other states, such as Maryland, which certified 74 clean marinas as of August 2004. Maryland Clean Marinas benefit from the significant publicity the program provides, which includes periodic newsletters and press releases, a flag to fly at the marina, and use of the program logo on stationary and other marina correspondence. The positive working relationship created also results in better compliance with environmental regulations without the need for costly enforcement actions.

Through the Massachusetts Clean Marina Program, CZM will be available to assist marinas with regulatory compliance and strategies to address the wide array of pollution issues. Together, this will result in effective, individual, and innovative solutions to environmental problems, improved public access to the water, and an economic boost to an industry so vital to the Massachusetts maritime economy.

Buzzards Bay:

Before and Beyond Bouchard

By Dr. Joseph Costa, Executive Director, Buzzards Bay Project

THE SCENIC COASTLINE OF BUZZARDS BAY includes sandy beaches, productive shellfish beds, and valuable wetlands and habitat, all of which justified its designation as an Estuary of National Significance in 1985. Another important feature—the Cape Cod Canal—connects the upper end of Buzzards Bay to Massachusetts Bay, ensuring that this area is an important part of the East Coast coastal and inland waterways system. However, having commercial traffic lanes has its risks, and Buzzards Bay was the site of a number of notable oil spills in the 1960s and 1970s. It therefore surprised few that oil pollution prevention was one of the 11 priority action plans identified in the Buzzards Bay Comprehensive Conservation and Management Plan (CCMP), developed by the Buzzards Bay Project (BBP) in 1991. This concern was reasonable, not only because of past spills, but because cumulative inputs of oil from stormwater, industrial, and wastewater systems contributed more oil to Buzzards Bay than transportation accidents.

photo courtesy of Department of Environmental Protection's Southeast Regional Office

For the past decade, the BBP has worked with municipalities to improve preparedness for both small and large spills of oil. This training and focus paid off when on April 27, 2003, the oil tank barge Bouchard 120 struck bottom while entering Buzzards Bay, releasing an estimated 98,000 gallons of No. 6 fuel oil.

Local Responders First

When working with the BBP to develop the Oil Pollution Action Plan for the Buzzards Bay CCMP, area harbormasters, shellfish wardens, and fire departments knew from experience that they were the first responders. Whether there was a small fueling spill in a harbor, or a large accident offshore, they understood it might be many hours before either the U.S. Coast Guard or the state-hired Hazardous Materials (Hazmat) contractors would arrive on scene. Consequently, their goal was to increase municipal preparation, training, and coordination in dealing with oil spills of all sizes.

photo by Walter Janicek

An unfortunate scene in the post-Bouchard wake: Cormorants covered in oil, dead along the shores of Buzzards Bay.

In 1993, each municipality selected a representative to tackle the oil spill problem. They called themselves the Buzzards Bay Oil Spill Coordinators. The Buzzards Bay Action Committee, a municipal official organization, coordinated the effort and pushed the group forward. In 1994, they signed an oil spill mutual aid agreement pledging staff and resources to assist each other in the event of an oil spill. Between 1990 and 2001, the BBP contributed $65,000 to Buzzards Bay municipalities for oil spill boom and containment equipment, and the towns spent twice that amount of their own money. Harbormasters and shellfish wardens took Hazardous Waste Operations and Emergency Response (or "HAZWOPER") courses to meet federal Occupational Safety & Health Administration requirements so they could work alongside fire department staff. The BBP paid for municipal oil spill training at Massachusetts Maritime Academy, and the towns began annual training drills with the local U.S. Coast Guard station. In 2001, the oil spill coordinators even produced a Buzzards Bay Oil Spill Response Plan that listed trained municipal responders, their emergency numbers, sensitive area maps, and an inventory of each town's equipment.

The April 2003 Oil Spill and the Municipal Response

On the morning after Bouchard 120 struck bottom, Buzzards Bay Oil Spill Coordinators were put to the test. Except for the volume of oil spilled (less than 2.5 percent of the total on board), in many ways the Bouchard 120 spill represented a worst-case scenario. No. 6 fuel is particularly harmful to birds, conspicuous when washed on shore, and difficult to clean from surfaces. The vessel traveled 15 miles after the accident, creating a 10-mile long slick. In the ensuing days, unsettled weather, choppy seas, and ever-changing winds brought fragments of the slick to every municipality around Buzzards Bay, with new oil landing ashore each day for more than a week.

In the first 24 hours, the U.S. Coast Guard managed the damaged vessel, surveyed Buzzards Bay by helicopter and boat, and set up the Incident Command Center. At the same time, many local Oil Spill Coordinators set up their own town Command Centers. Municipal harbormasters began tracking the slick in boats and calling in coordinates, and town personnel began deploying boom to prevent oil from reaching sensitive areas. These local officials also began helping the Command Center responders. All around the bay, towns pressed harbormasters and fire departments and their vessels into service. They also helped many of the out-of-state contractors find launch areas and staging—no small feat given Buzzards Bay's complex coastline, numerous back roads, and unfamiliar Wampanoag Native American place names.

Communication Key

For municipal officials, the first 48 hours after the spill were frustrating because they felt communications between local officials and the state and federal responders were inadequate, and that local resources, knowledge, and expertise were not well integrated into the emergency response. In one instance, emergency response contractors placed boom under a causeway to capture an arriving slick, but no skimming boat was on scene. Local oil spill responders recognized that high tidal currents would soon push the oil past the boom into the embayment. Fire Chiefs on scene insisted that another boom be put in front of the advancing slick to deflect the oil to shore, where it could be captured. (Interestingly, this scenario precisely matched one of their training exercises.) Following a heated debate, the contractors agreed to deploy the deflection boom, and the shoreline cleanup crews collected the oil on shore.

After several days, the U.S. Coast Guard and Command Center were able to resolve these communication problems with local officials. However, discussions continue on how to best integrate local government into the critically important first few days of a major oil spill.

The Role of the Buzzards Bay Project

State and federal agencies employ an "Incident Command System" approach for managing disasters, which integrates the efforts of many organizations, including municipal officials. In the Bouchard 120 spill, a "Unified Command" was established composed of the U.S. Coast Guard, the Massachusetts Department of Environmental Protection (DEP), and the contractors for the Responsible Party. The Bouchard 120 Command Center was responsible for all aspects of spill response, clean up, and assessment. What possible role could a National Estuary Program like BBP play in an oil spill?

The answer became apparent hours after the spill when the Buzzards Bay Project phone lines became tied with calls from municipal officials, reporters, and area residents. Information—everyone wanted information, ranging from basic statistics about the physical features of Buzzards Bay, to boat traffic through the canal, to the number of commercial shellfisherman using the bays, to maps and aerial photographs. Much of this information was detailed in the CCMP, and this document and other detailed materials were available on the BBP website. As a technical assistance and planning agency, BBP also has extensive expertise in map creation and webpage management.

Because the Command Center was focused on responding to the spill, they could not answer the myriad of question from residents, reporters, and municipal officials, and the slow release or lack of certain information contributed to some inaccurate or misleading newspaper articles. To address the demand for information, we at the BBP began updating our website several times a day with new information, oil landing maps, and statistics about the spill and the Command Center response. We were in communication with municipal officials and agency personnel, and because the BBP could attend Command Center briefings not open to the public, were able to provide details and insights on cleanup activities not available elsewhere. The information was presented in the simplest factual terms without editorializing, and lead news agencies were visiting the BBP website for broadcast and print report updates.

During the early days of the spill, we saw a 20-fold increase in website visits, with more than a hundred thousand visitors coming to our website in the months following the spill. These efforts won praise for the BBP, both from state and federal agencies, and residents—many sending emails with their thanks. Weeks into the spill, it was well recognized that the BBP website was effectively communicating the excellent work of the Bouchard 120 Command Post.

Lessons Learned, Lessons Transferred

Even for estuaries with major shipping lanes, disasters like Bouchard are so rare they are measured in decades. Still, there are lessons to be learned and transferred. First, there is value in having trained local officials with adequate containment and absorbent materials on hand. Small spills of 10 to 100 gallons are common, and local officials can minimize the spread of pollution before state and federal agencies, or their contractors, respond. For larger spills, mutual aid agreements, and training exercises involving several municipalities can provide invaluable experience.

Equally important for Buzzards Bay was an outgrowth of this training program—a series of new initiatives by municipalities to reduce hydrocarbon release from boats and marinas. With a grant from the Massachusetts Office of Coastal Zone Management (CZM) in 1997, the Buzzards Bay Action Committee purchased oil absorbing "bilge socks" to hand out to every recreational boat with a bilge in Buzzards Bay. The Action Committee also began looking at fueling regulations to determine what steps can be made to reduce fueling accidents, another common source of spilled hydrocarbons. Many towns are now switching to 4-stroke engines to reduce hydrocarbons in another CZM-funded initiative.

photo by Aria Brisette

photo by Joe Costa

photo by Sarah Williams

The result of many hours of hard labor: Bagged trash containing oil-soaked sand and debris.

Rocks covered with that slick No. 6 in Mishuam.

Buzzard's Bay Project Director Dr. Joseph Costa helping with the cleanup efforts.

Finally, one of the most significant of the BBP's roles is to provide scientific and technical information to the public and to local government. With all that we did during and before the Bouchard oil spill, from printing maps and aerial photographs for shoreline cleanup assessment teams to assisting in wildlife rescue efforts, for many, the dissemination of information on our website became our most memorable contribution. However, our most lasting contributions will be our detailed analysis of the volume of oil spilled (which resulted in the U.S. Coast Guard rejecting lower estimates), our assistance in quantifying and characterizing environmental impacts, and our efforts to help local officials prepare for future spills.

Survey says... Members of the 2003 Northeast Invasive Species Survey team inspect a dock at the Massachusetts Maritime Academy.

photo by Dr. Judith Pederson, MIT Sea Grant

There Goes the Neighborhood: The 2003 Northeast Invasive Species Survey

By Peter Hanlon, Massachusetts Bays Program

Ceaseless drizzle, nonstop driving, questionable takeout meals… mere nuisances when tracking down sea squirts and a particularly nasty Korean whelk.

It was a common sight at marinas between Portland, Maine, and New York Harbor during the first week of August 2003—about 20 raingear-clad scientists, armed with nets and spatulas, hanging over docks and feverishly scraping off the marine life that had collected below. The flora and fauna found were a bit odd-looking and unfamiliar, even to these trained eyes that identified many species not native to these coastal waters. These biological invaders, called marine invasive species, were exactly what the scientists were searching for, not that they were hoping to find them, of course.

Uninvited Guests that Don't Leave

The spread of invasive species is a complex international problem that has existed since the age of exploration when humans began intentionally and unintentionally transporting plants, insects, animals, and viruses from one part of the world to another. More recently, terrestrial pests such as the gypsy moth (released in the United States in the late 19th Century), and the Africanized honeybee (expanding northward from Brazil since the 1950s), have become household names. The best-known U.S. aquatic invader is the zebra mussel (*Dreissena polymorpha*), introduced into the Great Lakes by commercial vessels in the 1980s and now beginning to infest lakes and rivers in New England. The zebra mussel breeds prolifically, encrusting power plant and industrial water intakes and threatening the survival of more-desirable native species. The U.S. Fish and Wildlife Service estimates that the zebra mussel will have a $5 billion economic impact over the next 10 years in the Great Lakes region alone.

The spread of marine invasive species into U.S. coastal waters has accelerated in recent decades due to expanded international shipping, the growth of aquaculture, the baitfish industry, the aquarium trade, and even international Internet purchases. These different pathways, called "vectors," allow invasives to spread into local waters, presenting unique challenges for coastal managers struggling to keep up with the potential threats that can arrive from literally any point on the globe.

To help address this problem, a coalition of Massachusetts state agencies, federal government officials, consultants, and other managers (known collectively as the Massachusetts Aquatic Invasive Species Working Group) developed the Massachusetts Aquatic Invasive Species Management Plan, which was approved in December 2002. This plan designated priority species for control and management, developed a coordinated monitoring and prevention strategy, and established objectives for educating industry representatives, government employees, and the general public about the aquatic invasive species problem.

However, the question of exactly which invasive species exist within the Commonwealth coastal waters remains unanswered. In 2000, the first rapid assessment survey of invasive marine species conducted along the Massachusetts coastline found that 10 percent of the species identified were not native, including two species that had never been seen before on the East Coast. While some non-indigenous species appear benign, others can spread rapidly and cause widespread economic and ecological harm. The European green crab (*Carcinus maenas*) and Asian shore crab (*Hemigrapsus sanguineus*), for example, are invasives that prey on commercially valuable shellfish, while other species can chew up piers and pilings, damage fisheries, or cause public health problems. The 2003 survey was intended to give scientists a broader look at which exotic species are here and how far they've spread since 2000.

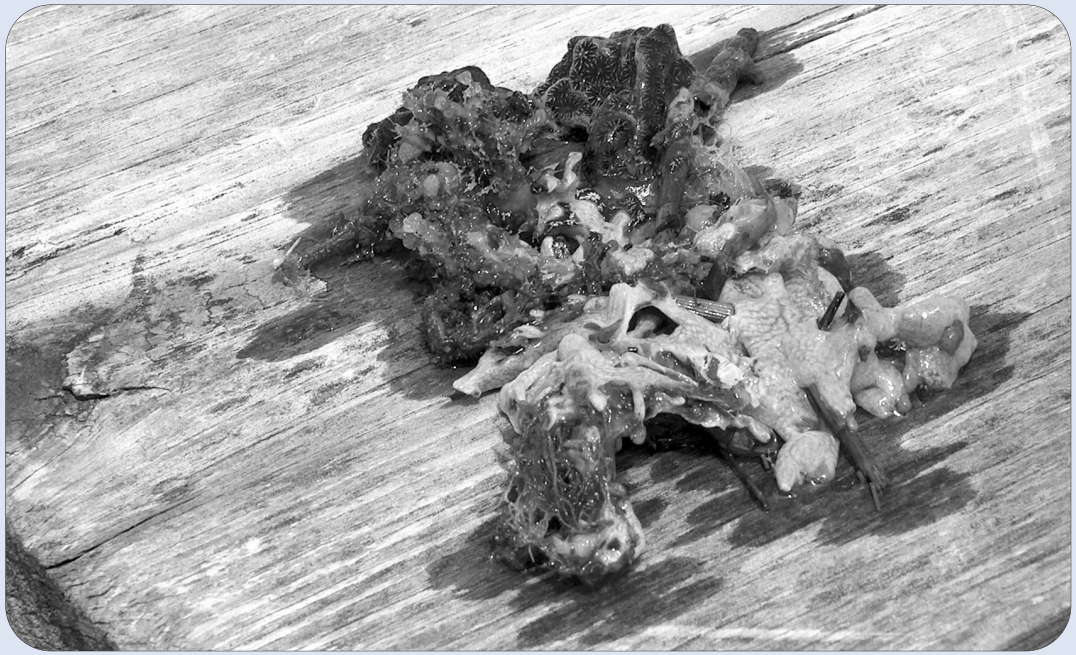
A Week on the Road

August 3-9, 2003—a marathon week that was a full year in the making. Funded by a grant from the U.S. Environmental Protection Agency (EPA), the seven-day survey was a mission to gather information on what species are actually present in the Northeastern U.S. waters. Jan Smith, Executive Director of the Massachusetts Bays Program (MBP), and Dr. Judy Pederson of MIT Sea Grant worked together with seven other National Estuary Programs to arrange the logistics of the rapid assessment survey. Everything was planned down to the minute as the roughly 20-member team had to visit three sites per day (often separated by long drives and occasional ferry connections), eat their meals on the road, visit laboratories for evening identification work, and find sleeping arrangements at night.

The team of scientists first gathered in New Hampshire after arriving from various universities around the country as well as from Italy, Wales, and South Africa. Each participant was an expert in a different group of species, ranging from crustaceans (hard-shelled aquatic species such as crabs and shrimp) to tunicates (sac-like animals with

siphons such as sea squirts). Graduate students from local universities also participated as assistants.

The team visited permanently floating docks and piers at each site, ensuring that they examined a structurally similar habitat type at each location. The docks and piers were also likely to have a variety of marine organisms and several years of growth underneath.



You from around here? On the dock, a Grateloupia doryphora awaits further examination.

During the 90-minute site visits, the scientists scraped as many organisms (both native and introduced) from the docks as they could find. The equipment used was simple—spatulas to scrape the organisms off and a net to catch them below. Sometimes the organisms were attached to ropes or buoys that were dragged up onto the dock for examination. Many of the common organisms could be identified right away and were put back in the water as a team member with a laptop recorded the identified species. For those organisms that could not be immediately recognized, a clump of the biological material was put in labeled jars in a cooler and taken back to the lab for a thorough evening investigation under a dissecting microscope, sometimes lasting for up to six hours.

Despite a workday that typically lasted from 7:00 a.m. until 11:00 p.m., the scientific crew volunteered their time largely because of their keen interest in invasive species. The team rarely found themselves alone during that rainy first week of August as numerous newspapers, local television stations, and curious onlookers visited over the course of the 20 site visits. Even the National Geographic Society joined the survey for a couple of days to film a segment for an "Explorer" television program.

Now . . . The REALLY Hard Part

As successful as the survey was, it is just one of the first steps in the fight to control the spread of marine invasive species. The goal of those involved with the survey is to continue their research by repeating the process every four to five years to keep pace with potential future invaders. However, the time in between surveys will be spent on the difficult task of implementing the Massachusetts Aquatic Invasive Species Management Plan. Prevention is the focus of the plan, but if prevention fails and a harmful species is introduced, a rapid response protocol is needed to let federal, state, and local officials know what approaches they have available to prevent an emergency. A task force is currently developing this rapid response protocol, which will provide detailed pre- and post-invasion steps for officials to take in case of a harmful invasion. The Massachusetts Office of Coastal Zone Management and its partners are also working to fill in the gaps between invasive species surveys by training citizens, local officials, and others who live and work near the coast to monitor invaders.

Another key element will be education and training. Survey organizers and members of the Massachusetts Aquatic Invasive Species Working Group will continue to hold workshops for coastal scientists, managers, government agency personnel, and graduate students to give them skills necessary to identify non-native species. The Massachusetts Bays Program is also working with pet stores to educate aquarium owners on how to properly dispose of exotic fish and plants to avoid introducing potentially harmful species into the marine ecosystem.

Though Northeastern coastal waters have yet to witness an invasion as ecologically and economically destructive as that of the zebra mussel, the threat of invasives is significant since marine ecosystems are essentially borderless. Regional coordination and cooperation is necessary to effectively prevent and control future invasions of exotic marine species. Rapid assessment surveys like the one conducted in 2003 are a crucial first step in identifying the species that are here, welcome or not, and whether any of those strange-looking invaders could cause real damage to these shores.

MASSACHUSETTS MOST WANTED

By Peter Hanlon, Massachusetts Bays Program

Asian Shore Crab

(aka *Hemigrapsus sanguineus*)

Last Seen: Rocky intertidal zone from Canadian border to North Carolina.

Wanted for: Gathering in densities of up to 100 individuals per square yard in Massachusetts coastal waters and consuming large quantities of native species.

European Green Crab

(aka *Carcinus maenas*)

Last Seen: Intertidal and subtidal zones from the Gulf of St. Lawrence to Delaware.

Wanted for: Eating as much as $44 million per year worth of shellfish in New England and Atlantic Canada.

Green Fleece Alga

(aka *Codium fragile* or "Deadman's Fingers")

Last Seen: Attached to hard surfaces in intertidal and subtidal zones from the Gulf of St. Lawrence to North Carolina.

Wanted for: Displacing kelp beds that support commercially important shellfish and groundfish species.

Lace Bryozoan

(aka *Membranipora membranacea*)

Last Seen: Kelp beds in the Gulf of Maine.

Wanted for: Destroying kelp beds and causing a decline of habitat for important finfish and invertebrates; aiding and abetting a fellow invasive, *Codium fragile* (see left).

Tunicates or Sea Squirts

(aka *Ascidians*)

Last Seen: Attached to hard surfaces such as docks and piers throughout Northeastern U.S. waters.

Wanted for: Competing for living space with native species; wreaking havoc on aquaculture; fouling vessels, pipes, traps, etc.

GoMOOS: A Virtual Link to the Gulf of Maine

By Anne Donovan, CZM

EL NINO. Before the historically weird weather patterns of 1997-98, and the tremendous press coverage they generated, most people had never heard of it. Today, this weather phenomenon, which is periodically generated when an unusually warm ocean current appears in the Southern Pacific around Christmastime, is well known by those who could not escape the effects (and the press coverage) of the worst El Nino event in over a century. For us in Massachusetts, it meant a mild winter. For many others it meant drought or flood, causing death and destruction with estimates of more than 2,100 fatalities and $33 billion in property damage.

A similar event that occurs in our own backyard, however, is largely unknown. A climate cousin of El Nino, the North Atlantic Oscillation (NAO), is based on the pressure difference between air over Iceland and air over the Azores in the middle Atlantic. These differences are measured through an NAO Index. During a positive index period (when pressure is high over the Azores and low over Iceland), the Northeastern United States tends to see mild, wet winters. This flip-flops during negative index periods, when cold air and resulting snowy periods occur. Although the NAO is the dominant influence on New England's weather, relatively little is known about this phenomenon and how to forecast it and its effects. That's where GoMOOS comes in.

GoMOOS, or the Gulf of Maine Ocean Observing System, is a national pilot program designed to collect and disseminate data from above and below the ocean surface. GoMOOS has deployed 10 buoys throughout the Gulf of Maine, from Massachusetts Bay to the Bay of Fundy. Every hour, these buoys measure winds, waves, temperature, and fog (at the surface) and currents, temperature, salinity, color, turbidity, dissolved oxygen, and other parameters (below the surface). This information can be used by mariners, coastal managers, scientists, and others who need reliable and frequent data on ocean and weather systems.

The GoMOOS website includes hourly data from each of these buoys; wave, current circulation, and weather forecasts; data maps depicting currents, waves, water temperatures, wind speeds, and about a dozen other water and atmospheric parameters; detailed information about the Gulf of Maine and NAO; and much more about the project. Check it out at http://www.gomoos.org/.

photo by Neal Pettigrew, University of Maine

Ask Joe: All About Habitat

By Arden Miller, CZM

During the time you've been involved in coastal issues, what's the most significant thing that's happened in terms of impact on ocean habitats overall? Locally?

In an overall way, the most significant change has been in awareness—people around the world are much more aware of how things impact the ocean today than they were 20 years ago. Locally, with the passage of the 200 Mile Limit Law (also known as the Magnuson Stevens Act) in 1976, the U.S. was given jurisdiction over fisheries within 200 miles of the coast, which changed things dramatically for fishermen by excluding non-U.S. fishermen from fishing in these areas. And then, if you want to talk really local, moving the sewage outfall pipe from Boston Harbor to Deer Island and cleaning up the Boston Harbor has had a huge, positive impact on the overall health of marine habitats.

What environmental situations that affect marine habitats do you foresee becoming headline news in the next 10 years?

One that is just coming to the forefront right now is noise in the ocean. Between motorized vessels, dredging, laying oil pipelines, steam ships, turbo-powered boats, and all of the explosions and sonar activity—both military and commercial—an octopus's garden can be a pretty noisy place! Until the modern age, this wasn't the case and we're just starting to really study just how much of an issue it is. A second issue is the endocrine disruptors. Between people and animals, sewage and runoff, chemically produced hormones are ending up in our waters. The hundreds of new chemicals that have come about to make our lives healthier, wealthier, and better are big unknowns as far as the future goes. We know they're getting into the oceans, but the cumulative effects probably won't be known for years to come.

Where, in your opinion, is the most pristine marine habitat?

That's a hard one. If we're talking about the Earth, I'd say areas such as the Abyssal Plain and the Mid-Atlantic Ridge; these are areas so deep that man isn't able to explore or exploit them, so there are no traces of intervention. Within New England, the Sea Mounts (off the continental shelf) are probably the most unsullied area. But if we're talking about Massachusetts, well, we've been making a mark around here since the days of the Vikings! If I had to pick a place within our waters, though, I would say Halfway Rock, between Gloucester and Boston, outside of Salem Sound, is among the most pristine areas.

What do you think of the broadcast of "reality TV" for lobsters? Is this a trend that will impact ocean habitats for other forms of marine life?*

I love it! I can't wait until it comes to my cable line up! We know so little about the lives of lobsters and this greatly broadens our knowledge. Even the little incremental increases in what we know, like where they meet to mate, help us know their habits and, ultimately, know how to put more of them onto the dinner table! (In a way that promotes the most sustained management of the species, of course.) As for other sea life, we've been learning about whales and seals by putting devices on them that allow us to monitor the pressure, temperature, and depths of their travels. In the future, this kind of monitoring will only increase as our technological abilities develop further.

Lastly, what is your personal favorite habitat?

That's an easy one: the rocky outcrops in Salem Harbor—that's where I get my lobster dinners! (n.b.: Joe is a licensed non-commercial lobster permit holder who collects his dinner donning scuba gear.)

* **Lobster Trap Video** (LTV) documents the lives of lobsters via video recorders. To view, go to: http://zoology.unh.edu/faculty/win/lobsters/LTV/ltv.htm.

Gyotaku

By Arden Miller, CJM

Pronounced "gee-oh-tah-koo," gyotaku is Japanese for fish ("gyo") rubbing ("taku"). As far back as 1862, Japanese fishermen would record their catch by covering the fish with sumi ink and pressing it onto rice paper. When an exceptional fish was caught, its weight, type, and the location of the catch were recorded under the print. Fish, a staple of the Japanese diet, were revered and many poems were written in their honor. Often, the poems and gyotaku were hung in the fishermen's shops. These pieces were admired by non-fishermen and believed to symbolize prosperity and health and people began hanging them as artwork in their homes. Well-to-do citizens commissioned them and what began as a practical way to record details became prized works of art.

To make your own gyotaku, you will need a fresh or rubber fish. For a more diverse marine habitat, you can add other sea life replicas (e.g. seahorse, seaweed). So, select the type of gyotaku you would like to make, and follow the directions to create a unique piece of art work!

Rubber Fish

YOU'LL NEED:

- rubber fish and any other rubber sea life that you would like included (the more details, the better)
- thick water-soluble ink (linoleum block print, speedball)
- paint brushes (one that's 1/2- to 1-inch thick, and a small watercolor brush for painting the eyeball)
- newspaper
- paper (use a heavy weight white or off-white for best results)

1) Cover your work surface with several layers of newspaper.
2) Brush a thin coat of ink on one side of the fish in both directions.
3) Slide the top layer of newspaper out so that the surface under the painted fish is clean.
4) Place a piece of paper several inches above the fish and carefully drop the paper (don't move it once it's on top of the fish or it will smudge).
5) Gently rub—don't press!—all parts of the fish (it's helpful to have a second person holding the fish's head so that nothing moves and smudges during the rubbing).
6) Carefully peel off the paper, allow to dry, and repeat with any other sea life (e.g., starfish, seahorses) that you'd like included in your art work.
7) With a small brush, paint in the eyeball and add any other embellishments (you could paint seaweed, for example) for a more modern take on an old form of art.

IF YOU CAN'T CATCH YOUR OWN FISH and don't have access to a fresh fish market, fish of all kinds and sizes can be purchased (whole) in the frozen seafood section of most grocery stores. Rubber fish can sometimes be found in toy stores, craft stores, or places that sell gag gifts, or you can order them on line at www.enasco.com. The other supplies you need—paint, brushes, modeling clay—are available at arts & crafts stores.

Real Fish

ITEMS LISTED ON LEFT OTHER THAN "RUBBER FISH," PLUS:

- a fresh fish (less than 24 hours old, or a previously frozen thawed fish)
- modeling clay (to shape the tail and fins)
- small piece of cotton (optional to cover fish eye—see step 4)
- a lemon
- paper towels

1) Squeeze lemon juice over the fish and gently wipe with paper towel to remove any slime.
2) Place pieces of modeling clay under the fish fins for support and arrange to look natural.
3) If the fish has been gutted, stuff the insides with paper towel so that the belly is full. If still intact, put a small piece of paper towel in the fish's mouth and vent so the insides won't leak.
4) Remove the eye or cover it with a small piece of cotton.
5) Let the fish dry completely (you can use a hair dryer to speed the process up).
6) Cover your work surface with several layers of newspaper.
7) Brush a thin coat of ink on one side of the fish in both directions (to ensure the most detailed print).
8) Use the small brush to coat the fish's lips and the tips of the fins and tail (leave the eye blank—this will be painted in later).
9) Carefully remove the clay and add extra newspaper under the fins to support them.
10) Slide the top layer of newspaper out so that the surface under the fish is dry and clean.
11) Follow steps 4-7 on left.

Note: A fish can be used more than once for a print; just clean with lemon juice between printings (if you're using different colors, begin with the lightest colored paint).

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photos (clockwise): Patricia M. Pelczarski; Sara Joor; Arden Miller